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ABSTRACT

This workbook contains exercises to be used in conjunction with the CORD National Research Training Manual (EA 003 105). Special emphasis is placed on the issues of writing behavioral objectives and correctly designing, implementing, and evaluating a program of instructional improvement. Also included are exercises in general areas of research design, measurement, and proposal writing. An appendix provides answers to the exercises. (RA)

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CORD

National Research Training Manual Workbook (2nd ed.)

edited by Clark A. Smith

A project of the RED TRAIN program

a research, evaluation, and instructional development training program of the Teaching Research Division of the Oregon State System of Higher Education

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WORKBOOK
for the
NATIONAL RESEARCH, EVALUATION, AND
DEVELOPMENT TRAINING MANUAL

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This workbook was designed to help you - not to add to your burdens. For most exercises, answers are given in the manual. For other exercises, a group discussion of your own answers appears more productive.

You will note the exercises are presented in many different ways and that clear-cut answers are not always available. In cases where "objective" answers are not possible, the exercises hopefully aid in making clear the issues discussed in the CORD manual.

Exercises for Section I

Behavioral Objectives

Exercise 1.1.

1. Statements of goals serve the purpose of
   a. specifying behavioral objectives.
   b. specifying teacher behavior.
   c. specifying the aims of education.
   d. specifying terminal behavior.

2. Terminal behavior is a term
   a. reserved exclusively for the final product of education.
   b. having to do with the end behavior in a single sequence of specific behaviors.
   c. dealing with that which occurs at the end of the school year.
   d. used to describe goals for teacher behavior.

3. The specification of enabling objectives
   a. is the first step in planning instruction.
   b. leads from an assumed entry level to a terminal objective.
   c. helps the teacher in defining instructional goals.
   d. assures complete coverage of instructional content.

4. Behavioral objectives differ from operational objectives in that they
   a. describe readily observable and measurable behaviors.
   b. are aimed at the learner.
   c. are aimed at the teacher.
   d. are more global in nature.

5. Stating objectives in behavioral terms has the advantage of
   a. making clear the behavior represented by the objective.
   b. making the teacher's work easier.
   c. making it possible for all students to achieve the objective.
   d. allowing for individual differences.

Check your responses in the appendix of this workbook (p. 80).

Exercise 1.2.

1. Which of the following behaviors would be the least difficult to observe or measure?
   a. Understanding
   b. Appreciation
   c. Knowing
   d. Solving

2. Which of the following represents an appropriate "audience" for a behavioral objective?
   a. All students of a particular grade level.
   b. Some students in a particular class.
   c. Those students expected to achieve the objective.
   d. Those behaving appropriately.

3. Which of the following represents the "conditions" of a behavioral objective?
   a. The setting in which the student's behavior is to occur.
   b. The actions which the teacher will observe.
   c. The actions of the leader.
   d. The criteria for measuring the student behavior.

4. Which of the following represents the "degree" aspects of a behavioral objective?
   a. The setting in which the student's behavior is to occur.
   b. The actions which the teacher will observe.
   c. The actions of the leader.
   d. The criteria for measuring the student behavior.

5. Which of the following is true of the "degree" component of a behavioral objective?
   a. It tells what tools the students may use.
   b. It states 100% performance on a criteria test.
   c. It specifies a level at which an objective is assumed to have been achieved.
   d. It has little relationship to the objectives which may follow.

Examine the following statements. Identify and enter the indicated components in the spaces following each statement. Check whether each component is "good" or "needs work".

6. Students will demonstrate perception of tonal relationships within a scale (major or minor) by singing with syllables or numbers, a familiar song at a tempo established by the teacher.

   a. Audience component_____

   _____

   Well stated: _____ Yes _____ No

b. Behavior component: _____

_____

Well stated: _____ Yes _____ No

c. Condition component: _____

_____

Well stated: _____ Yes _____ No

d. Degree component: _____

_____

Well stated: _____ Yes _____ No

7. When presented with geometric models of a cone, cylinder, prism, cube and sphere, 10th grade geometry students will write the correct names of each model in the order presented. All names must be correct, but spelling is not important.

a. Audience component: _____

_____

Well stated: _____ Yes _____ No

b. Behavior component: _____

_____

_____

Well stated: _____ Yes _____ No

c. Condition component: _____

_____

Well stated: _____ Yes _____ No

d. Degree component: _____

_____

Well stated: _____ Yes _____ No

8. All first grade students will match given letters with given pictures of familiar objects according to the beginning letter in the name of the object.

a. Audience component: _____

_____

Well stated: _____ Yes _____ No

b. Behavior component: _____

_____

Well stated: _____ Yes _____ No

c. Condition component: _____

_____

Well stated: _____ Yes _____ No

d. Degree component: _____

_____

Well stated: _____ Yes _____ No

9. Students in introductory statistics will calculate means and standard deviations to the nearest decimal.

a. Audience component: _____

_____

Well stated: _____ Yes _____ No

b. Behavior component: _____

_____

Well stated: _____ Yes _____ No

c. Condition component: _____

_____

Well stated: _____ Yes _____ No

d. Degree component: _____

_____

Well stated: _____ Yes _____ No

10. Students will know the correct spelling for 100% of the words.

a. Audience component: _____

_____

Well stated: _____ Yes _____ No

b. Behavior component: _____

_____

Well stated: _____ Yes _____ No

c. Condition component: _____

_____

Well stated: _____ Yes _____ No

d. Degree component: _____

_____

Well stated: _____ Yes _____ No

Compare your responses with those in the appendix of this workbook (p.80).

Exercise 1.3.

The importance of an accurate and complete description of a task cannot be over emphasized. Until such time as a task is completely described it will be virtually impossible to identify the important components of the task that the learner must master.

A task description relates to the steps or actions that are components of the total task procedure whereas behavioral descriptions are represented actions that might be acceptable as indicators of the desired behavior. For example:

1. Willingly follows prescribed safety practices in the metal shop, as evidenced by such actions as:

    a. Always shuts down machines before making adjustments or performing maintenance.

    b. Always wears the prescribed safety equipment such as goggles, leather gloves, etc.

    c. Always insures that the object being worked upon is firmly secured before proceeding to work on it.

    d. Does not allow waste materials to accumulate around his work station.

Without first identifying task components, you will find it extremely difficult, if not impossible, to establish objectives at any level. These definitions, or descriptions, are required by the rationale underlying the concept of behavioral objectives which specifies that first one must describe job or task performance requirements, second write formal statements of objectives at various levels, focusing on indicators which are representative of the desired behaviors, and finally using these objectives in the design and evaluation of instruction.

Here is another example of an operational objective:

"Upon completion of the 12th grade, the learner will possess a functional command of written English."

This objective could serve very well as a goal or as an operational objective in that it does specify the audience, and the general area of content. In this present state, however, it is of little value in either design or evaluation of instruction. It lacks an adequate description of the performance situation, specific behaviors which would indicate the desired types of behavior and a criterion level for that behavior.

From this objective, however, we may derive several terminal objectives, for example:

"When given a description of a position from the classified ads of the daily newspaper, the 12th grade student will be able to write a letter of of application for employment."

Attempt to list at least three more terminal objectives.

A._____

_____

_____

B._____

_____

_____

C._____

_____

_____

Examine your three objectives. Do they include both the behavioral and content dimension? Do they represent meaningful units of performance in relation to the specific content area? Are they critical to instruction; is it imperative that they be included as a part of the operational objective?

Now let's address the problem of enabling objectives for the terminal

objectives which you have just written. Typically when most instructors attempt to write behavioral objectives at the enabling level they will write statements something like this:

"The student will be able to properly place the inside address on a business letter."

"The student, upon completion of the unit of instruction on writing letters of application, will be able to type a letter of application making fewer than five errors."

"The student will be able to list, with fewer than three errors, the components of a letter of application."

These examples demonstrate an overriding concern for convenience of measurability. While easy to measure, they are extremely difficult to justify as valid behaviors in relation to the operational objective. While they may appear to be rather gross, they are unfortunatley rather typical of the objectives written by many teachers. More appropriate enabling objectives might be:

"Know and apply appropriate salutations."

"Be able to systematically follow both a block and an indented business letter format."

Try to write enabling objectives for your terminal objectives.

Exercise 1.4.

The rationale presented for the development of an adequate set of objectives, a progressively more specific hierarchy from broad goals to enabling objectives, gives rise to a number of important concerns. First, numerous studies indicate there is a direct ratio between the time required to decide what students should learn and the distance of the person or persons making these decisions from the instructional process. For example, you could expect that instructional decisions made by the president of a university would require a great deal more time than the same type of decisions made by an assistant professor in the discipline of concern. This phenomenon is largely due to the expertise and somewhat broader concerns of persons who are further removed from instruction. Consequently, objectives developed by persons distant from instruction are usually difficult to translate into a meaningful instructional design. Secondly, broader objectives do not adequately describe appropriate learner performance. Adequate and appropriate in this case refer to the failure of such objectives to clearly communicate the action expected of the student. For example, "to prepare students for taking their place in the world" has questionable value in communicating directly the <u>student</u> behavior.

The third trouble spot is the typical reaction of over concern for measurable performance as compared to behavior that would be useful after instruction, either for more advanced instruction or at some future time. This concept, applied to a broad university education, would require that a performance of interest be transferable to some work or life situation. These situations may be categorized as specific action situations, such as a particular job or an extra course of instruction, and generalized action situations such as a professional career or for some general development of the individual.

Ammerman notes: "The definition of the perfomance situation is a very critical step in the derivation of valid objectives. It is this definition that establishes the basis identifying the important performance conditions and standards. Additionally, it identifies and limits the scope of the whole situation for which objectives must be determined."

A fourth concern implicit in the rationale of broad to specific objectives is the necessary relationship that must be established between cognitive and affective outcomes. There is probably little doubt that affective behavior is based to large degree in cognitive knowledge. In specifying cognitive behavior however, we are most concerned that the student shall <u>be able</u> to do a task when required. In relation to affective behavior, however, we are more concerned that he <u>does do</u> it <u>when it is appropriate</u>, after he has learned that he can do it. Paradoxically, the reinforcement contingencies within the school environment more often reward a student for things he can do than for those he does do, even though it is the latter which is implicit in a great majority of instructional objectives.

Finally, there is the difference between terminal and enabling objectives. Terminal objectives, were defined in the manual as those which identify student action or performance on a meaningful unit. They represent the ultimate performance capabilities sought by a specific instructional program and their derivation is related directly to the notion of relevance within the intended performance situation and criticalness of their need for formal instruction. A meaningful unit, as used here, must be a unit that is subject to specific behavioral analysis and which may provide clear information about the instructional intent of the course designer. For example, an objective such as "be able to read German" provides the designer with little information about the intended utility of the desired behavior. As such it would be difficult to

call this a meaningful unit of performance. On the other hand an objective which required that the student be "able to read and apply the information found in a German language version of a Volkswagon owner's manual" is a somewhat different type of objective. It does specify the potential work situation and a potential use in life.

Enabling objectives by comparison, are totally dependent upon terminal objectives for their value. As defined earlier in the chapter they are the components actions, knowledges, skills, etc. which a student must learn if he is to attain the terminal objective. They serve to bridge the gap between where the student is at the beginning of instruction and where he should be upon the completion of a segment of instruction. They not only are directed to where the student is prior to instruction and where the designer wants him to be after the instruction but they are also directly related to the transitional behavior of the learner within a given instructional unit.

> Let's try to apply some of these ideas to this typical statement of philosophy. "The school will accept the responsibility of guiding the process of personality and character development so that pupils will be able to maintain lives personally satisfying to them and to carry on pleasant and humane relationships with other persons."

Utility in the right situation is rather clear cut in this statement--one certainly wants to be able to carry on pleasant and humane relationships with other persons. The big question mark is what does this mean in terms of specific learner characteristics and behaviors that will facilitate attainment of the desired behaviors? We will need to examine the statement very carefully to identify specific content and behaviors that will enable us to design an instructional unit which will ensure terminal behaviors of the type desired.

The ideal situation, in beginning to analyze this statement of philosophy, would be to interview the person or persons who drafted the statement.

Since we are unable to do this, we must recognize that the task which we are about to do is only an exercise.

To begin, what key words from this statement need a more careful definition before they can be translated into operational objectives?

Compare your responses with those contained in the appendix of this workbook, (p. 81) then proceed to the next page.

Exercise 1.5.

Because we are unable to interview or meet in any way the person or persons who wrote this statement, perhaps it would be more expedient to utilize this statement as a screen for a set of objectives that we may develop independently. Look at the following list of objectives and identify those which you feel are consistent with the philosophical statement.

1. Finds pleasure in reading for recreation.
2. Enjoys reading books on a variety of themes.
3. Derives satisfaction from singing with others.
4. Responds emotionally to a work of art or musical composition.
5. Develops a keen interest in his physical surrounding -- in trees, flowers, birds, insects, stars, rocks, physical processes and the like.
6. Enjoyment of participation in varied types of human relationships and in group undertakings.
7. Plays real number games for fun.
8. Assumes responsibility for drawing reticent members of a group into conversation.
9. Deliberately examines a variety of viewpoints on controversial issues with a view to forming opinions about them.
10. Expresses a preference for artistically appropriate choice, arrangement and use of ordinary objects of the environment.
11. Forms judgments as to the responsibility of society for conserving human and material resources.
12. Engages on his own in a variety of constructive hobbies and recreational activities.
13. Practices the rules of safety -- in the school, on the playground, on the street and in the home.

14. Obeys playground regulations.

15. Completes his homework.

16. Accepts differences in race and culture among people known.

17. Listens to others with respect.

18. Increase in sensitivity to human need and pressing social problems.

19. Awareness of the feelings of others whose activities are of little interest to ourselves.

20. An awareness that there is an interdependence of nations in the creation and preservation of a satisfactory postwar world.

21. Sensitivity to social situations that are urgent.

22. Knowledge of the vocabulary of the fine arts sufficient to be able to read and converse intelligently.

23. Understanding of some other principle elements in the heritage of western civilization.

24. The ability to interpret various types of social data.

25. The ability to be sensitive to factors which may render predictions inaccurate.

26. The ability to apply social science generalizations and conclusions to actual social problems.

27. Skill in applying principles of democratic group action to participation in group and social situations.

28. The ability to infer the author's purpose, point of view, or trains of thought and feeling exhibited in his work.

Now check your responses with the comments in the appendix of this workbook (p. 81).

Exercise 1.6.

You may have recognized that many of the objectives listed in Exercise 1.5. were from the two taxonomies of Educational Objectives, Handbook I: Cognitive Domain and Handbook II: Affective Domain. As a further exercise, try to identify which of the objectives are from Handbook I, and which from Handbook II.

These objectives are from Handbook I: (Cognitive objectives)

_____

_____

_____

_____

These objectives were taken from Handbook II: (Affective objectives)

_____

_____

_____

_____

Now compare your responses with those contained in the appendix of this workbook (p. 82).

Exercise 1.7.

Bud Paulson, in the chapter on evaluation states: "The chain of events that leads from the introduction of an instructional stimulus to the ultimate attainment of an instructional objective is not a single contingency, or one 'if . . . then' statement, but really a long series of such contingencies. Many of these are not amenable to observation, and even if they were, the task would soon prove unmanageable. There are, however, a number of points in this sequence where systematic observation can be quite meaningful and useful. One such sequence can be described as follows:

Point of origin
↓
Instructional stimuli
↓
Process indicators
↓
Learning indicators
↓
Diagnostic indicators
↓
Criterion indicators
↓
Ultimate values or goals."

The set of indicators listed may serve as an excellent guide to defining or establishing the purposes for a given evaluation program. They represent "evaluation milestones" specific points at which sytematic observations can be made in a useful and meaningful way.

As an evaluator attempting to identify the purposes for an educational program, one of your tasks will be to associate specifications, or indicators, with each of these "milestones." I have identified <u>one possible</u> specification for each "milestone" below. Try to list several others.

1. Point of origin

   a. ---- twelve year old students with D.A.T. scores of at least 39 on the VR and NA and 82 on the space relation --------

   b. _____

   _____

   c. _____

   _____

   d. _____

   _____

2. Instructional Stimuli

   a. --- employ a vocabulary level not to exceed that of an average Lincoln Elementary School 6th grader who -----

   b. _____

   _____

   c. _____

   _____

   d. _____

3. Process indicators

   a. --- shall elicit an overt response to at least 90% of all frames---

   b. _____

   _____

   c. _____

   _____

   d. _____

   _____

4. Learning indicators

   a. --- will be able to solve problems of a specified class with 90% accuracy upon completion of the program.

b. _____

_____

c. _____

_____

d. _____

_____

5. Diagnostic indicators

a. When one half of the frames are completed, will be able to define the following words: ----------

b. _____

_____

c. _____

_____

d. _____

_____

_____

6. Criterion indicators

a. --- able to indicate logical fallacies in an argument of the following type ----------

b. _____

_____

c. _____

_____

d. _____

_____

7. Ultimate values or goals

   a. --- manifest a respect for democratic ideals as indicated by systematic testing behavior at ----------

   b. _____

   _____

   c. _____

   _____

   d. _____

   _____

Exercise 1.8.

Suppose that a public school district established the following philosophic base for its academic program:

"To develop the ability to communicate ideas; to think independently, creatively, and critically; to cultivate a desire to do one's very best; and to inspire in each individual a zeal for lifelong learning and self improvement."

The following objectives (goals) were established to implement this element of the district's philosophy:

1. To develop individual skills and aptitudes leading to gainful and rewarding employment and economic independence.
2. To help students learn to think logically, to solve problems efficiently, and to make wise judgments.
3. To assist the student in finding meaning and purpose in his life.
4. To develop individual creativity and appreciation of the aesthetic values in our culture.
5. To help students understand the value, the principles and privileges of our form of government and the obligations of the individual as a citizen of his country and of the world.

Your task, at this time, is to write operational, terminal and enabling objectives using this philosophic statement and the goals identified as your guides. Remember that your operational objectives serve to identify important content, terminal objectives serve to identify meaningful behavioral units, enabling objectives identify the enroute competencies needed to attain the terminal objective. Remember too that all useful objectives contain both a behavioral and a content component.

The diagram shown in Figure 1 (following page) may be of some assistance to you in identifying the functional relationships that exist between each of these categories of objectives.

Operational Objectives

Terminal Objectives

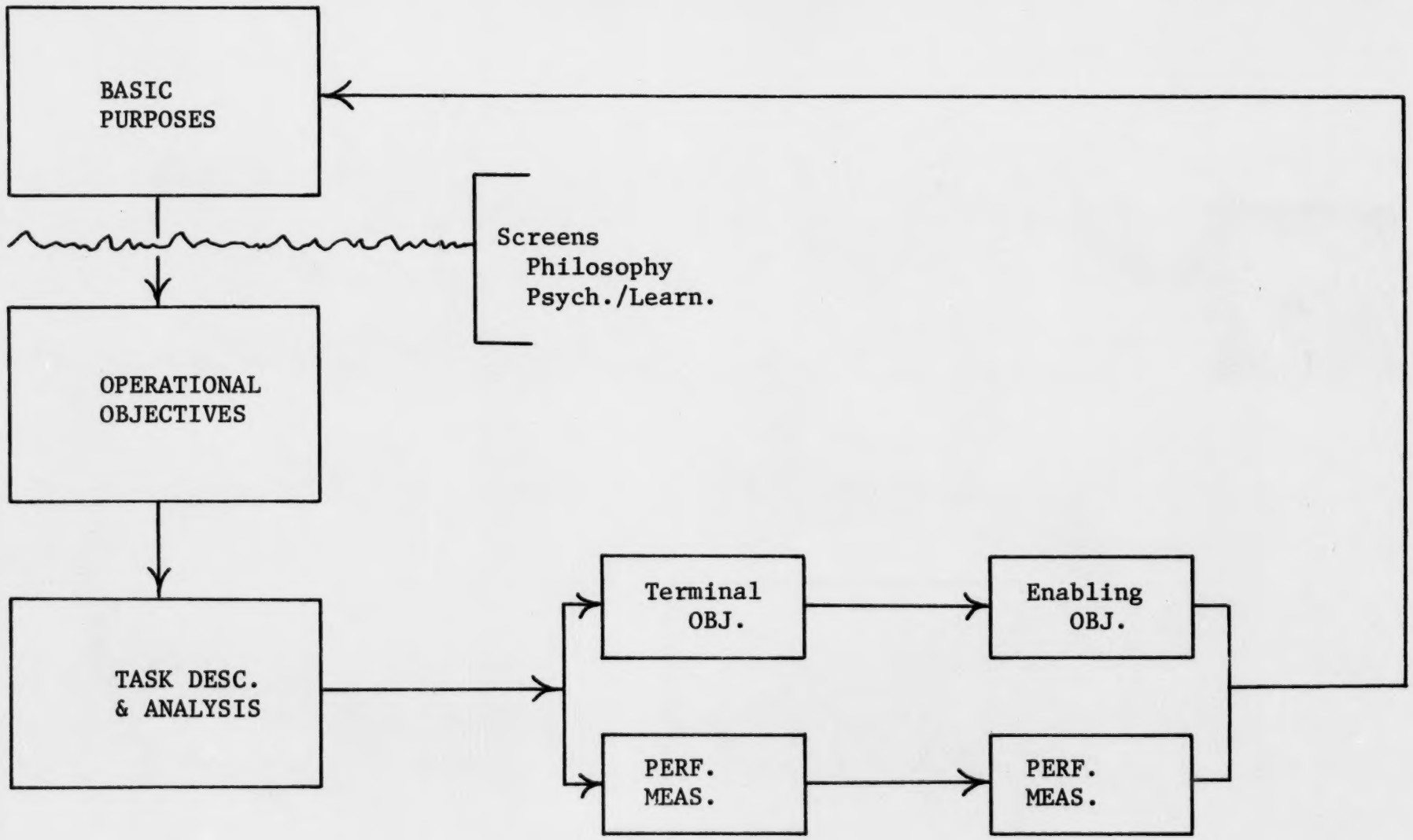


Figure 1.

Objective Relationships

Enabling Objectives

A continual reference has been made to the need for both the behavioral and content dimension in your collection of objectives. A two dimensional chart was suggested as having potential usefulness for testing the completeness and appropriateness of your objectives. Use the chart in Figure 2 as a guide to test the completeness of your set of objectives.

As a final test of your collection of objectives, check to see if they include: (1) a description of the learner group; (2) a complete description of the behavior of concern; (3) a complete description of the conditions under which that behavior is to be demonstrated; (4) a criterion which may be used to assess the learner's attainment of your objectives.

Another important element of stating objectives is identifying indicators that may serve to evaluate the learner's performance and subsequently to determine whether or not he has attained the specified level and type of behavior.

Go back through your collection of objectives and see if you can write a performance measure for each of the enabling and terminal objectives. If you find that you cannot specify valid and appropriate performance measurement procedures, then you will need to revise your objectives. Recall that we should not be overly concerned with the measurability of the desired behavior but more with its usefulness in a life situation and criticalness to instruction. This means that mere translating "knows and understands principles of vacuum tubes" into "recalls and states principles of vacuum tubes" does not accomplish a change of importance. Neither is it relevant to say that the learner must list the elements of a sequence getting 8 out of 10 correct when all 10 elements of the sequence are needed to satisfactorily complete a task, nor is it appropriate to have a student demonstrate some level of competency in writing poetry to appreciate English History.

Behavioral Dimension / Add the Content Dimension	1. Understanding of important facts and principles.	2. Familiarity with dependable sources of information.	3. Ability to interpret data.	4. Ability to apply principles.	5. Ability to study and report results of studies.	6. Broad and mature interests.	7. Social attitudes

Figure 2

Behavior-Content Relationships

Exercises for Section II

Designing Instructional Systems

Exercise 2.1 Specifying Instructional Sequence

1. What two major purposes are served by objective analysis?

_____

_____

2. Arrange the following steps in objective analysis in the proper order.

Order	Step
_____	a. Repeat procedures for each competency that is determined.
_____	b. Check efforts to test relevance of competencies.
_____	c. Identify terminal objective.
_____	d. Arrange competencies in hierarchical fashion.
_____	e. Starting with the terminal objective, ask the question, "What kind of capability would the learner have to possess to accomplish this objective?"
_____	f. Identify learner entry level.

3. Look at the figure in Table 1, page II-8 of the manual. Locate the box labeled 1a ("Calculate cubic feet in a cylinder.") and box labeled 1c ("State barrels in terms of cubic feet.") List for each objective the enabling objectives a student must achieve in order to attain Objectives 1a and 1c. Assure yourself that the hierarchy as constructed is reasonable.

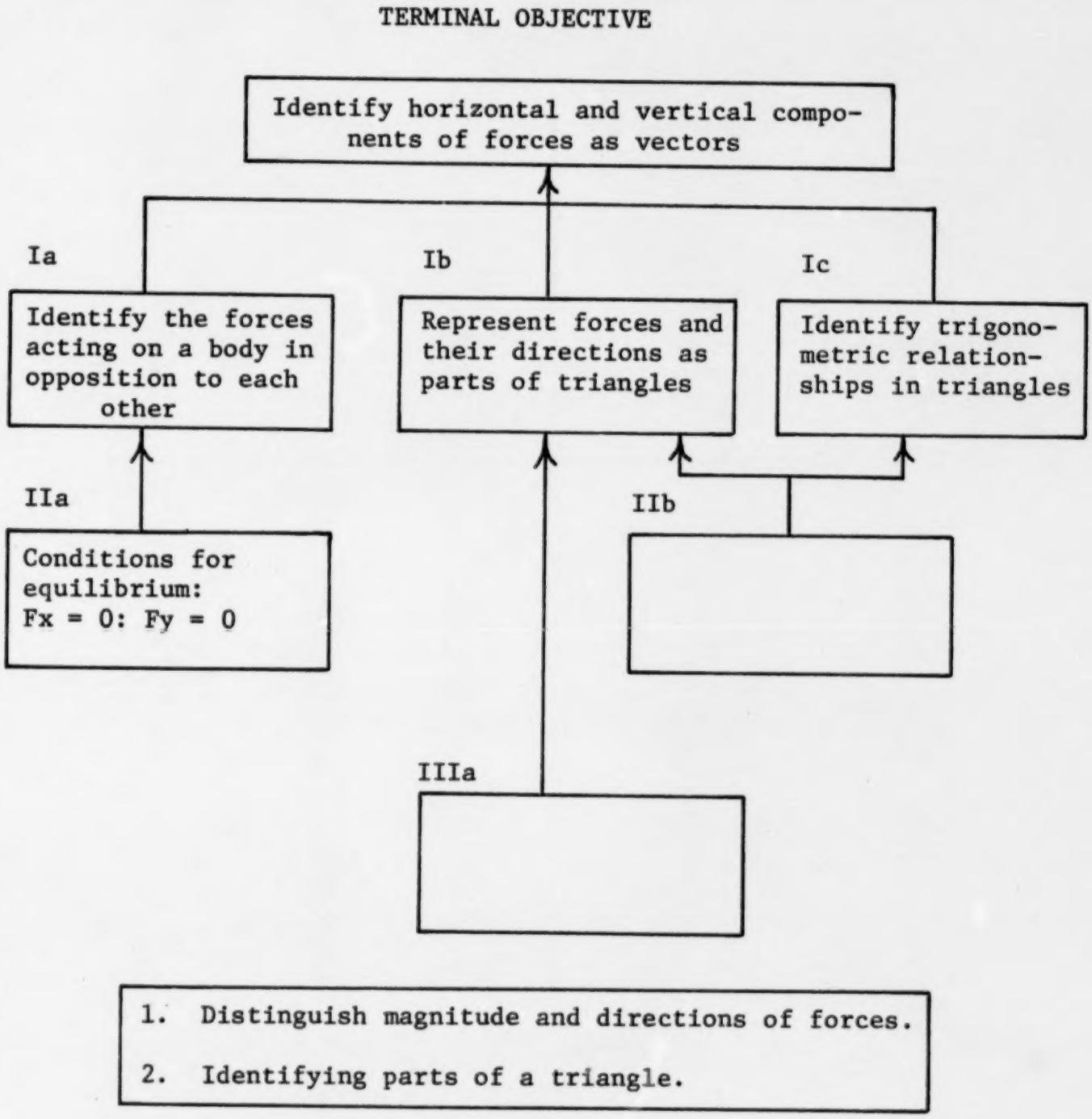
1a. _____

_____

1c. _____

_____

4. Examine the two enabling objectives listed at the bottom of this diagram. Then ask yourself what the student would have to know in order to achieve Ib and Ic. From the diagram it can be seen that one of the two objectives is a prerequisite to both Ib and Ic, the other a prerequisite to only Ib. Place the appropriate enabling objectives in boxes IIb and IIIa.


TERMINAL OBJECTIVE
Identify horizontal and vertical components of forces as vectors
Ia
Ib
Ic
Identify the forces acting on a body in opposition to each other
Represent forces and their directions as parts of triangles
Identify trigonometric relationships in triangles
IIa
IIb
Conditions for equilibrium: Fx = 0: Fy = 0
IIIa
1. Distinguish magnitude and directions of forces.
2. Identifying parts of a triangle.

5. Five enabling objectives are listed below. While they have been taken from material you have seen, do not check back to it until you have attempted this exercise. Consciously ask yourself, "What would the student have to know?" Ask this question for each objective. Then order them beginning with the terminal objective.

	Order
(1) Specify the intersection set of a simple curve and parts of lines	Terminal Objective (1)
Identify and draw a set of points	_____
Identify and draw a simple closed curve	_____
Identify and draw a point	_____
Identify and draw a curve	_____

6. Do the same for the following objectives as you did for the previous exercise.

(1) Identify and draw a triangle	_____
Identify and draw a set of points	_____
Identify and draw a point	_____
Identify and draw a line segment	_____
Identify and draw a straight line	_____

7. For practice, do the following tasks, then compare with others doing the same tasks. Exchange critiques.

   a. Select a topic with which you are familiar. It should be one that could be taught to students in about 15 or 20 minutes. Write a terminal performance objective(s) for the topic. Conduct an objective analysis.

   b. Select a topic that is closely related to the one chosen in Exercise a. Repeat the procedure outlined above, but relating this objective to the one specified previously.

   c. Select a topic (or terminal objective) that might take an hour or so of instruction. Repeat procedures outlined above.

   d. (Optional) Select a course you teach. Determine all terminal objectives and conduct a complete objective analysis. (This is best done in the privacy of your padded cell.)

Check your responses with those contained in the appendix of this workbook (p.83).

Exercise 2.2 Stimulus Situation

1. Identify each of the instructional messages (representing stimulus situations) as to their function, i.e., orienting, shaping, assessing.

   a. "Push Button A if you don't understand what I'm talking about."

   _____

   b. "Several purposes are served by instructional shaping messages or acts:

      (1) knowledge is presented;
      (2) information about skills..."

   _____

   c. "List on your paper seven major causes of the Civil War."

   _____

   d. "In previous sessions, we talked about one-celled organisms. We learned that ... and today we want to examine through the microscope some of these organisms. I am sure that when you finally spot an organism after perhaps minutes of searching, you'll be fascinated by their appearance and the way they move."

   _____

   e. "Students, please take your seats now."

   _____

   f. "Now we've been studying about the earth and the way it was formed. Today we're going to study about anticlines."

   _____

   g. "Anticline is spelled a-n-t-i-c-l-i-n-e."

   _____

   h. "Choice C is the correct answer."

   _____

2. Identify each of the following instructional messages, in terms of: (1) exposition, (2) illustration, and (3) demonstration.

   a. "Here is a balloon. I've put some black tape on it. I want you to notice that the tape in one place is together. In the other place, the tape is apart with some gap in between. (Instructor demonstrates with balloon in front of class)."

   _____

   b. "Anticlines form on the crust of the earth. Remember that we found out the other day that the earth is very much like an air-filled balloon. Remember we pushed on the balloon to show you what happens when you push on the earth."

   _____

   c. "See this picture? Let me show you what an anticline looks like. See the folds? (Instructor presents picture of anticline to class.)"

   _____

3. Match column B to column A by placing the letter in column B in the blank before the appropriate word in column A.

Column A	Column B
1. _____ Knowledge	A. Find the mean of the total group and then for boys and girls separately.
2. _____ Comprehension	B. If you have several hypotheses suggested for solutions, what kinds of evidence would you want to collect about each so that you could make the best choice? Why did you select the one you did?
3. _____ Application	C. Would you explain how you arrived at that conclusion?
4. _____ Analysis	D. What is the name of the largest city in the State of Oregon?
5. _____ Synthesis	E. What is meant by the term "irony"?
6. _____ Evaluation	F. Of the three answers given which do you consider to be the best?

4. Match the letters from the following to the appropriate statement. Place the letter on the blank to the left.

   A. Demand with suggestion
   B. Demand with cushion
   C. Demand with explanation
   D. Demand without qualification

   1. _____ Complete that letter today.

   2. _____ Because you had to do another report today, you can finish that letter tomorrow morning.

   3. _____ The completion of the prerequisite material might be a good idea before you attempt to do this exercise.

   4. _____ I know the deadline is August 8th, but you can get it completed.

5. The following list contains five forms of instructional messages that might be used by an instructor:

   a) real-life stimuli

   b) concrete representation

   c) iconic representation

   d) analogue representation

   e) symbolic representation

   Indicate for the stimuli (or feedback) forms below which type is represented.

   _____1) Aetna Drivo-trainer (driver education simulator)

   _____2) A typical lecture

   _____3) Drawing of a piece of tongue-and-groove wood

   _____4) Explanation of a problem-solving sequence with pictorial illustrations

   _____5) A worm held by a biology instructor

   _____6) Map of the Soviet Union

_____7) Red light as indicator of incorrect response

_____8) Demonstration of heart action by using a hand pump to fill a glass

_____9) Model of a submarine

____10) A chart, "History of Military Uniforms", showing typical costumes

____11) The Golden Gate Bridge

____12) A slap in the face

____13) "Yes, you are correct"

____14) A picture of a face with a smile

If possible, work with a colleague and attempt to stump each other with examples you fabricate.

Check your responses with those in the appendix (pp. 83-84).

Exercise 2.3

1. The development of empirically-based instructional systems can significantly advance the state of the art since such efforts can lead to determining the effects on learning of a number of factors considered in the development.

   True _____

   False _____

   Justify your answer.

2. The use of the instructional system design approach has two major effects when research is to be conducted on instruction. One is that it limits subjectivity where objectivity may be applied. Identify the second.

Now check these responses with those on page 84.

Exercises for Section III

Instructional Systems Development

Exercise 3.1.

Consider a brief example in which the prototype system is at the earlier stages of development. Presume that development is underway on instructional materials designed to teach 8th graders to use the Readers' Guide. Specifications call for visuals in the form of overhead transparencies designed to present concepts of the Readers' Guide referencing system and to be accompanied by student worksheets containing both explanatory statements and elements requiring application. Several parts have been developed: visuals that replicate specific Readers' Guide reference entries and work sheet items keyed to the visuals that define various symbols and abbreviations used in the entries and explain their relationships. One of the prepared visuals contains the following entry:

Aeronautics: Mid-air payoff. il Time 93:62+ J1 21 '67

The Student Worksheet accompanying this visual has the following exercise in conjunction with it:

On the screen is a sample of an entry from the Readers'Guide. In the spaces that follow, copy the following information: Title of article, author, type of illustration, name of magazine, volume, page, month, day, and year.

A Teacher's Guide, also a part of the system, has the following explanatory notes for the teacher:

Using the overlay, discuss (1) author and title, (2) illustrations, (3) name of magazine, (4) volume number and pages, and (5) date.

Now put yourself in a hypothetical try-out situation with a single learner. Regard the above visual element, worksheet statement, and teacher note as the segment you are to try-out. In the spaces below identify briefly (1) what details you would consider in arranging the try-out; (2) how you would conduct the try-out; and (3) guess at what effects you might observe during the try-out regarding (a) comments the learner might make (b) reactions you might observe in the learner, and (c) reactions you might observe from the Teachers' Guide.

(1) Arranging the try out:

_____

_____

_____

(2) Conducting try out:

(3) a. Possible learner comments:

b. Possible learner reactions:

c. Possible reaction to the Teachers' Guide:

Some suggested answers to this exercise will be found in the appendix of this workbook (p.85).

Exercises for Section IV

Evaluation of Instructional Systems

Exercise 4.1

In the evaluation of instructional systems there are a number of key points at which systematic observation can be quite meaningful and useful. List these points and describe at least one indicator (observable and measurable event or behavior) for each.

1. _____

   a. _____

   _____

2. _____

   a. _____

   _____

3. _____

   a. _____

   _____

4. _____

   a. _____

   _____

5. _____

   a. _____

   _____

6. _____

   a. _____

   _____

Now check your responses with those in the appendix (p.86).

Exercise 4.2 (After reading the entire evaluation section)

Define "formative" evaluation and list three techniques that might be employed for conducting such an evaluation of an instructional system.

A. Formative evaluation:

_____

_____

_____

_____

_____

_____

B. Techniques:

1. _____

_____

2. _____

_____

3. _____

_____

Now check against the answers in the appendix (p.86).

Exercises for Section V

Measurement

Exercise 5.1. Introduction

1. The role of measurement in instructional research is:

_____

_____

_____

_____

2. The role of measurement in instructional systems evaluation is:

_____

_____

_____

_____

Check your responses with those in the appendix of this workbook (p.87). Read Part I of the measurement section in the manual before proceeding further.

Exercise 5.2. A Point of View (Study Exercise)

1. Write out the three interrelated assumptions the author makes about measurement in education.

1)_____

_____

_____

2)_____

_____

_____

3)_____

_____

_____

2. Write out some of the implications of these assumptions for taking measures in education.

_____

_____

_____

_____

_____

_____

Proceed with reading in the measurement section of the manual, Part II through Constructs and Measurement.

Exercise 5.3. Theory of Measurement: Constructs and Measurement.

Let's assume you wish to help someone develop a meaningful creative writing course. Your plan is to provide a measurement procedure that helps the instructor monitor what he is doing. Using the following key questions as a guide, write down the considerations for measurement of this kind.

1. What is/are the construct(s) involved with this measurement task?

2. What properties can you derive from the construct(s)?

3. What indicants would you be willing to accept as evidence of your construct?

4. Discuss your above responses in relation to the following problems you may have experienced.

   a. The problem of inference: _____

   b. The problem of restrictiveness: _____

   c. The problem of meaning: _____

Now compare your comments with those in the appendix (pp.87-88). Then read the rest of Part II before going on to the next exercise.

Exercise 5.4. Theory of Measurement: Operations/Error and Measurement

Indicate whether the following statements are true or false.

T___F___ 1. Nominal scales dictate that all items given the same numerical designation are equal in relation to the property being measured.

T___F___ 2. Ordinal scales will indicate the amount of a given property an item possesses.

T___F___ 3. Ratio scales are frequently used in the behavioral sciences.

T___F___ 4. In the behavioral sciences, measurement procedures will frequently approximate interval scales.

T___F___ 5. Random error tends to bias true measurement through repeated measures.

T___F___ 6. Improper administration of a test will increase the degree of random error.

T___F___ 7. The postulates of measurement apply to all levels of measurement.

T___F___ 8. A statement of criteria for measurement, in effect, specifies the circumstances under which members of a population will be considered equal.

T___F___ 9. School letter grades usually are representative of an interval scale.

T___F___ 10. Ratio scales specify true quantities of a property starting from a level where there is a complete absence of it.

Check your answers with those in the appendix of this workbook (p.88). Then proceed with reading Part III of the measurement section of the manual.

Study Exercise

Exercise 5.5. Classes of Measures in the Behavioral Sciences

Please complete the following study exercise. The exercise will serve two purposes: 1) to structure you into the reference material in Part III and 2) to provide you with information which may facilitate expansion of relevant ideas for your own measurement tasks.

1. List below three or more measures (or types of measures) upon which you place the greatest reliance or for which you feel the greatest need.

   a. _____

   b. _____

   c. _____

   _____

   _____

   _____

2. Now examine the Table in Part III and locate each measure listed above. Enter below some strengths and weaknesses for each measure, the data form, and the data level. Then add your own comment with respect to the adequacy of each for your purpose.

   a. Strengths: _____

   _____

   Weaknesses: _____

   _____

   Data Form: _____

   Data Level: _____

   Comment: _____

   _____

   b. Strengths: _____

   _____

   Weaknesses: _____

   _____

Data form: _____

Data level: _____

Comment: _____

_____

c. Strengths: _____

_____

Weaknesses: _____

_____

Data form: _____

Data level: _____

Comment: _____

_____

_____

_

Exercise 5.6 Trustworthiness of a Measure

1. Match the following terms and definitions by placing the appropriate letter of the definitions in the space provided to the left of the item numbers.

_____1) Consistency	a. The degree to which the function of a measure is consistent with a theoretical view of that which is to be measured; indirectly, the repute in which the theory is held.
_____2) Accuracy	
_____3) Fidelity	
_____4) Representativeness	b. The degree to which a measure samples the situations in which the behavior under consideration can be reflected.
_____5) Relevance	
_____6) Construct Validity	c. The degree to which a measurement may reflect an exact amount or quantity of a characteristic. (Not usually attainable in the behavioral sciences.)
	d. The degree to which a measure is logically appropriate for that which is to be measured.
	e. The degree to which the individual may be expected to respond to a measurement in the same way when taken several times under similar conditions.
	f. The degree to which a measure draws on the performance of the concrete behavior that the measure claims to assess.

Compare your answers with those contained in the appendix of this workbook (p.88), then go to the next item.

2. The following test was proposed as a means of selecting able students for a creative writing class. Read the name of the test, the directions for it, and the test items.

The ITRSCW

Instructions: So you want to be a writer. Do the following tasks in two minutes.

1. Describe a sunset as viewed from across a mountain lake.

2. Briefly discuss antidisestablishmentarianism.

3. Define simile.

4. Identify the metaphors you used in (1) above, or if you didn't use any rewrite it and underline the metaphors in red pencil.

5. Write a statement about why you want to take a course in creative writing.

Now criticize each aspect and item of the test using the criteria terms contained in Part IV. Use the following outline.

a. Title: _____

_____

b. Directions: _____

_____

_____

c. Items: _____

_____

_____

Compare your responses with those in the appendix of this workbook (p.88), then proceed by reading Part V of the Measurement Section of the manual.

Exercise 5.7. Competency with which a measure is applied.

1. The following classes of evidence needed in support of the competency with which a measure is applied have been set forth in Part V of the Measurement Section of the manual:

    a. Administrative Reliability
    b. Recording Reliability
    c. Observer/Coder/Scorer Reliability.

Examine the following measurement instruments and indicate the classes of evidence needed for each.

Test	Evidence
1) Standardized achievement test	_____
2) Projective test	_____
3) Observation system requiring assignment of behavior to categories	_____
4) Unstructured interview	_____
5) Proficiency test	_____

2. How often does administrator and coder reliability need to be demonstrated?

Check your answers with those in the appendix of this workbook (p.89). Read Part VI of the Measurement Section of the manual before going to the next exercise.

Exercise 5.8. Development of Educational Outcome Measures.

1. Given the following major steps in the development of low inference measures, explain them in terms of the specific classes of activities or governing rules involved with each.

a. Planning the measure

1) _____

_____

2) _____

_____

3) _____

_____

b. Developing the measure

1) _____

_____

2) _____

_____

3) _____

_____

c. Trying out the measure

1) _____

_____

2) _____

_____

d. Evaluating the measure

1) _____

_____

2) _____

_____

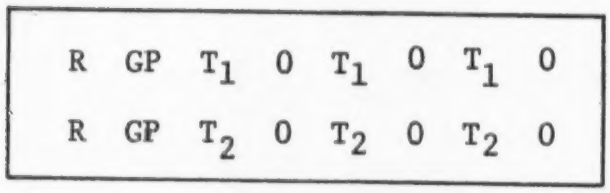
2. In order for the steps listed above to apply to the development of high inference measures, what additional step is required?

Compare your responses with those contained in the appendix of this workbook (p.89).

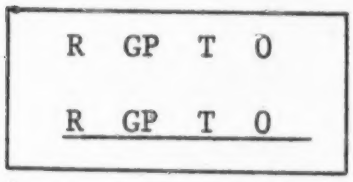
Exercises for Section VI

Research Design

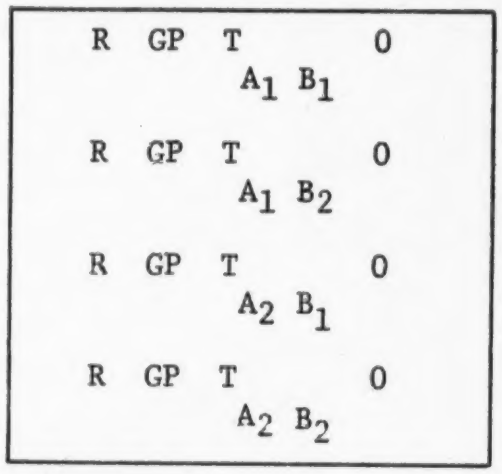
Exercise 6.1 Indicate the name of each design on the line below each. (Check answers on p.91.)



a. _____

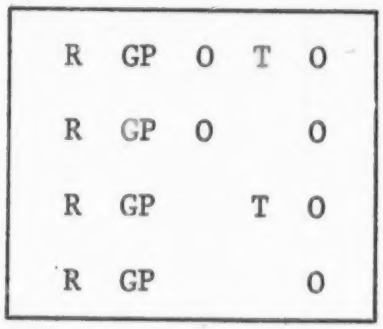


b. _____

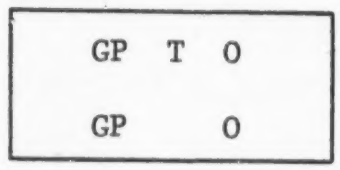


c. _____

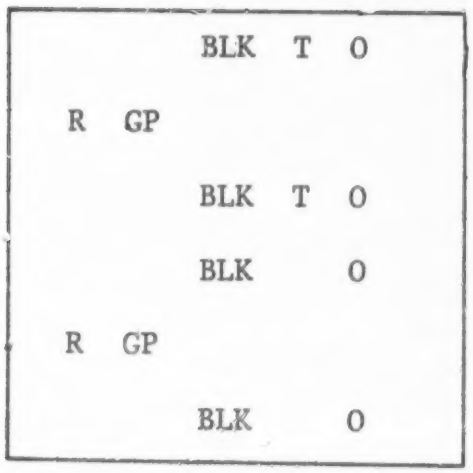
d. _____



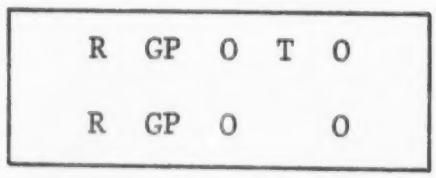
e. _____



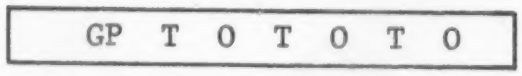
f. _____



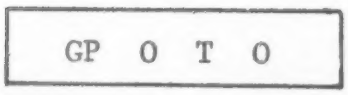
i. _____



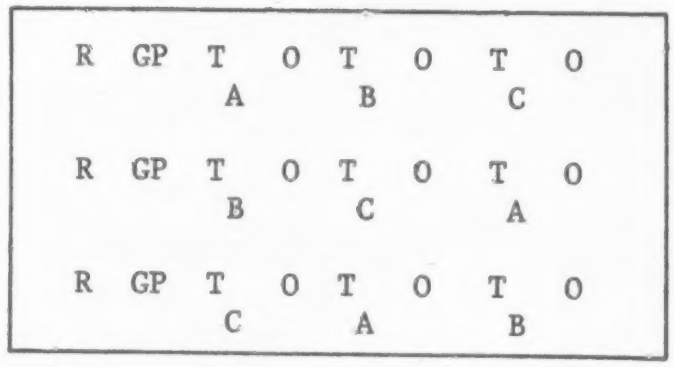
g. _____



h. _____



j. _____



k. _____

Exercise 6.2. Read each of the following proposed investigations and indicate the design implied.

1. This experiment will investigate the effects of competitive and cooperative conditions on groups that are performing either a cognitive (problem solving) or a manual (building a bird house) task. Subjects will be randomly assigned to one of four groups:

I. competition - manual task
II. competition - cognitive task
III. cooperation - manual task
IV. cooperation - cognitive task

A rating procedure has been devised to score the groups' performance according to efficiency, creativity, and time for completion of the task.

Design: _____

2. Overweight women will be randomly assigned to one of two different treatment groups. Group I will receive a new diet drug which induces nausea whenever the subject eats; Group II will receive abundant praise and lavish good will daily for adhering to their diets. All subjects will be weighed on the first day of each month for three months to assess the effectiveness of each treatment.

Design: _____

3. The music teacher in a prominent boys' prep school has updated his Music Appreciation course to appeal to the hip generation. Before school starts, he divides the senior class boys into those with long hair and those with short hair. Boys in each of these groups are then assigned randomly to either the new or the conventional course. At the end of the semester, the PDQ Bach Attitude Survey will be used in conjunction with the final exam to assess the value of the new course.

Design: _____

4. A group of educators undertakes the task of assessing four teaching methods in each of three subject-matter areas. Students are randomly assigned to one of twelve groups. Each group will take either a course in history, in mathematics, or in English. Each subject matter area will be taught by four methods: lecture, slide-tapes, regular textbooks, or programmed textbooks. The groups will be compared at the end of the year to determine which teaching methods are best for which subject matter areas.

Design: _____

5. The Oregon Cultural Heritage test will be used to assess the degree to which a new state history text promotes cultural identification among Oregonians.

Prior to the opening of school, all 9th graders will be assigned to one of four groups:

Group I will receive a pre-test, the new text, and a post-test

Group II will receive the pre- and post-tests only

Group III will receive the new text and a post-test

Group IV will receive a post-test only.

Design: _____

Check your answers against those in the appendix (p.91).

Exercises for Section VII

Data Analysis

Exercise 7.1. Types of Research Questions

Read each of the following statements and indicate the type of research question represented.

1. To determine the average reading achievement level at the end of the year in each of the 1st grade classes.

    a. Comparative
    b. Relational
    c. Descriptive

2. To determine whether any difference exists in reading level achieved, at the end of the year, between students in an i.t.a. first grade class and those in a traditional orthography class (TO).

    a. Comparative
    b. Relational
    c. Descriptive

3. To determine what impact scholastic attainment of teachers while in training has on those they subsequently teach.

    a. Comparative
    b. Relational
    c. Descriptive

4. To determine what fields of study are undertaken by graduates of our school who enter college.

    a. Comparative
    b. Relational
    c. Descriptive

5. To determine whether a new instructional aid has an impact on students.

    a. Comparative
    b. Relational
    c. Descriptive

6. To determine whether the degree of performance in a speed test is potentially influenced by IQ.

    a. Comparative
    b. Relational
    c. Descriptive

7. To determine the competencies held by successful auto mechanics.

    a. Comparative
    b. Relational
    c. Descriptive

8. To determine which of two instructional procedures will best achieve the objective.

    a. Comparative
    b. Relational
    c. Descriptive

9. To determine whether sex plays an important role in the choice of limited alternatives in a problem-solving situation.

    a. Comparative
    b. Relational
    c. Descriptive

10. To determine whether general problem-solving ability may have an effect on overall scholastic performance.

    a. Comparative
    b. Relational
    c. Descriptive

Now check your answers in the appendix of this workbook (p.92). Read Levels of Measurement, p. VIII-3 of the manual before attempting the next exercise.

Exercise 7.2. Levels of Measurement

1. Examine the following common assignments of quantifiable descriptors (numbers) and indicate the type of scale they most nearly represent.

   1) 0 = Boys; 1 = Girls
      a. Nominal c. Interval
      b. Ordinal d. Ratio

   2) 1 = Beef; 2 = Pork; 3 = Fish (In order of preference)
      a. Nominal c. Interval
      b. Ordinal d. Ratio

   3) 1 = Mathematics; 2 = Biology; 3 = Education
      a. Nominal c. Interval
      b. Ordinal d. Ratio

   4) 1"; 5"; 6";
      a. Nominal c. Interval
      b. Ordinal d. Ratio

   5) 1 = Physician; 2 = Manager; 3 = Custodian (In order of income)
      a. Nominal c. Interval
      b. Ordinal d. Ratio

   6) 0 lbs; 1 lb; 2 lb; 3 lb; ...x lbs.
      a. Nominal c. Interval
      b. Ordinal d. Ratio

   7) Grades where A = 4.0, B = 3.0, C = 2.0
      a. Nominal c. Interval
      b. Ordinal d. Ratio

   8) Room 1; Room 2; Room 3
      a. Nominal c. Interval
      b. Ordinal d. Ratio

   9) 1 - John; 2 - Jane; 3 = Mary (Rank order by grades)
      a. Nominal c. Interval
      b. Ordinal d. Ratio

2. Read the following data objectives and indicate the level of measurement represented.

   1) To provide a basis for reading groups by ranking the class according to standardized test scores.
      a. Class A c. Class C
      b. Class B

   2) To measure how far each child can jump before starting the new P. E. program.
      a. Class A c. Class C
      b. Class B

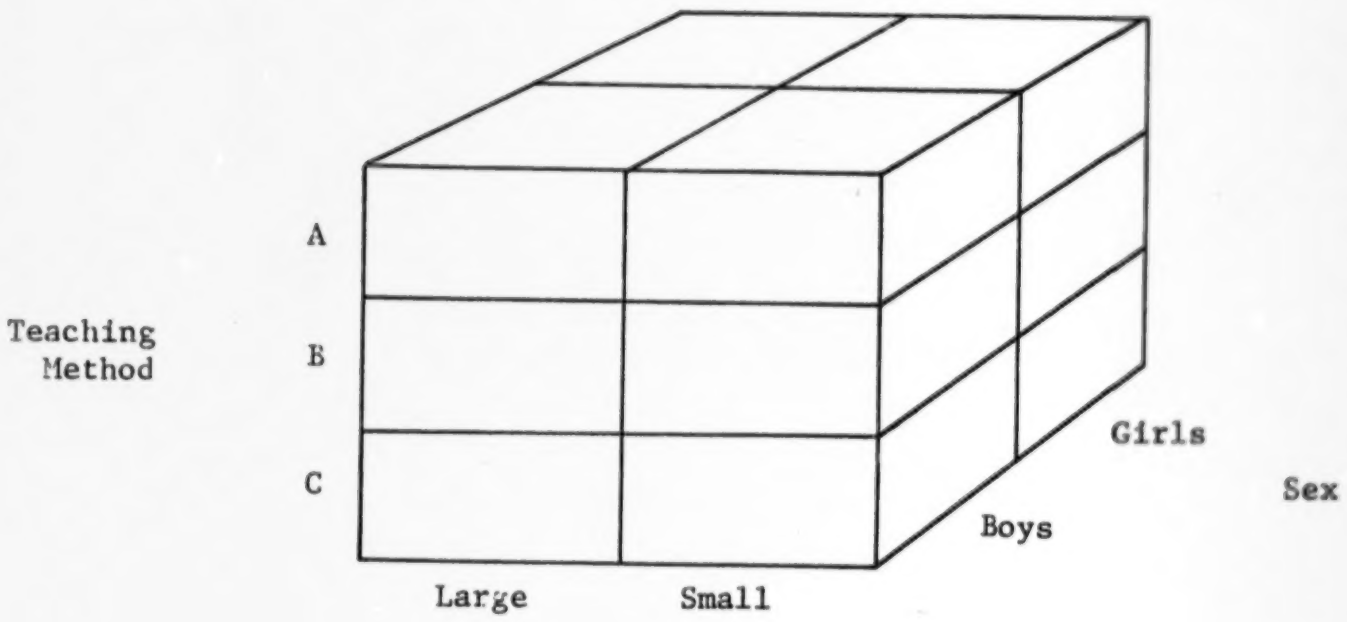
   3) To rank each child according to the distances in 2 above.
      a. Class A c. Class C
      b. Class B

   4) To measure the increase in vocabulary (number of words defined on a standard word list) in the class from the first to the end of the year.
      a. Class A c. Class C
      b. Class B

   5) To measure IQ levels in the classroom.
      a. Class A c. Class C
      b. Class B

Now check your answers against those in the appendix of this workbook (p.92). Read Number of Samples and Independence of Samples, page VII-5 of the manual in preparation for the next exercises.

Exercise 7.3. Number of Samples



1. In the diagram above:

   (a) What are the total number of dimensions (factors) being investigated?

   _____

   (b) How many categories are there within the factor of teaching method?

   _____

   (c) How many categories within the factor of class size? _____

   (d) How many categories within the factor of sex? _____

   (e) Therefore, how many samples will the investigator need? _____

2. What three assumptions are usually made about what constitutes a "random sample"?

   (a)

   (b)

   (c)

3. Categorize the following as: I=independent samples, or R=related samples:

   (a) Comparison of pre-and post-training scores

   (b) Samples randomly selected

   (c) All subjects in the study given all treatments

   (d) Two groups selected from a larger homogeneous group.

Now check your answers against those contained in the appendix of this workbook (p.92). Proceed to Exercise 7.4.

Exercise 7.4. Number and Independence of Samples

Examine the following statements. Indicate how many samples (groups) are necessary and whether they would be independent or related samples.

1. You are going to compare the reading levels obtained by i.t.a. students with those obtained by TO students.

   How many? _____ Independent? _____ Related? _____

2. You wish to compare the reading levels of boys and girls in the i.t.a. and TO groups in 1) above.

   How many? _____ Independent? _____ Related? _____

3. You wish to determine whether a new instructional aid results in fewer anxious behaviors among students in a social studies course.

   How many? _____ Independent? _____ Related? _____

4. You wish to determine whether the new instructional aid used in the previous example, results in more effective instruction in the social studies course.

   How many? _____ Independent? _____ Related? _____

5. You wish to determine the change in attitude that takes place in your social studies class by comparing entry attitudes with year-end attitudes.

   How many? _____ Independent? _____ Related? _____

6. You wish to determine whether a new approach to a class would better achieve course objectives than does current practice.

   How many? _____ Independent? _____ Related? _____

7. You wish to determine whether a course in Black American history taught to an all white, an all black, and a mixed class achieves certain specified objectives relative to each race, and in which class(es) they seem to be best achieved.

   How many? _____ Independent? _____ Related? _____

8. You wish to analyze the possible relationships between teacher scholarship (defined in three levels) and the scholarship of their students.

   How many? _____ Independent? _____ Related? _____

9. You wish to determine whether those students having had a course in problem-solving do better in algebra than those not having had a course in problem-solving.

   How many? _____ Independent? _____ Related? _____

10. You wish to determine whether there are differences in the social concepts retained by boys at the end of a unit of instruction and those retained by girls.

    How many? _____ Independent? _____ Related? _____

11. You wish to determine whether there will be differences in impact on children from economically depressed areas as opposed to children from high-income districts when exposed to three different levels of instruction. You plan to approach the same course in three different ways, 1) essentially theoretical and text oriented; 2) essentially practical application with no theoretical generalizations; 3) a combination of the two. Outside reading will not be required to minimize probable differences in reading ability. You will also wish to examine where possible differences in impact between boys and girls might occur.

    How many? _____ Independent? _____ Related? _____

Check your answers with those in the appendix of this workbook (p.93). Read A Note on Hypotheses, p. VII-8 of the manual before continuing.

Exercise 7.5. Hypotheses

Reexamine each statement in Exercise 7.4. Indicate the form of null hypothesis (Null Hypothesis I or Null Hypothesis II) you would most likely use for each. Justify your answer by indicating whether each should be designed to be an "experimental" or a "causal-comparative" study.

	Hypothesis		Study	
	I	II	Experimental	Causal-Comparative
7.4.1	____	____	____	____
7.4.2	____	____	____	____
7.4.3	____	____	____	____
7.4.4	____	____	____	____
7.4.5	____	____	____	____
7.4.6	____	____	____	____
7.4.7	____	____	____	____
7.4.8	____	____	____	____
7.4.9	____	____	____	____
7.4.10	____	____	____	____

Now check these answers against those contained in the appendix of this workbook (p.93). Proceed to next exercise.

Exercise 7.6. Analysis of Objective Data

Write out a statement of any investigation that has occurred to you during your current research training. Use any you may have developed for earlier Chapter Exercises. If they are not satisfying to you, elaborate on an instructional problem you may have and work it into a statement of objectives which could be measured. Then:

1. Write out the hypotheses necessary to test whether or not you achieve the objectives. State whether they represent type I or type II null hypotheses.

2. Indicate the class of data scales involved in the measurement process, the type of study represented, the number of samples involved, and the independence of the sample. Discuss.

Class of data_____Type of Study _____

How many groups? _____ Independent? _____ Related? _____

How many data samples? _____

Discussion:

Read to end of Section VII in the manual and study briefly the Table presented before proceeding to the next exercise.

Exercise 7.7. Identification of Statistical Procedures

By now you should feel reasonably comfortable in identifying Class A, Class B, and Class C data. You also have had exercises in discriminating between comparative, relational, and descriptive studies and have worked through independent and related samples. With these simple decision competencies, you are now ready to identify the statistical procedures appropriate for various research questions. The following studies have been suggested by Exercise 7.2, and have been elaborated to suggest the measures involved. Using the program provided in the manual (Table, pp. VII - 15,16), follow the steps indicated and state the statistical procedures appropriate for each of the studies.

1. To determine the average reading achievement level at the end of the year in each of the 1st grade classes. (Assume the use of standardized tests.)

   Statistical Procedures:_____

   _____

2. To determine whether any difference exists in reading level achieved, at the end of the year, between students in an i.t.a. first grade class and those in a traditional orthography class (TO). (Assume the use of appropriate standardized measures.)

   Statistical Procedures:_____

   _____

3. To determine what impact the scholastic attainment of teachers while in training has on those they subsequently teach. (GPA measures)

   Statistical Procedures:_____

   _____

4. To determine what fields of study are undertaken by graduates of our school who enter college, and whether they tend to cluster around specific fields.

   Statistical Procedures:_____

   _____

5. To determine whether the degree of performance (number of correct responses) in a speed test is potentially influenced by IQ.

   Statistical Procedures:_____

   _____

6. To determine the major competencies held by successful auto machanics. (Assume data to be in the form of stated skills listed on a check list.)

   Statistical Procedures:_____

   _____

7. To determine which of two instructional procedures will best achieve the objective. (Assume a multiple-choice test measure.)

   Statistical Procedures:_____ _____

   _____

8. To determine whether sex may play an important role in the choice of limited alternatives in a problem-solving situation. (Assume the problem-solving alternatives to fall into discrete classes.)

   Statistical Procedures:_____

   _____

9. To determine whether general problem-solving ability may have an effect on overall scholastic performance. (Assume the measures to be in terms of number of problems solved and GPA.)

   Statistical Procedures:_____

   _____

10. To relate the reading achievement rankings of students with their weights to see if better readers tend to weigh more.

    Statistical Procedures:_____

    _____

11. A personnel manager wishes to determine if ability as measured by the Wonderlic, age at time of employment, and standing in H. S. graduating class are predictive of success/failure among insurance salesman.

    Statistical Procedures:_____

    _____

12. Is preference for pork, chicken, beef, ham, or fish independent of sex.

    Statistical Procedures:_____

    _____

13. To what extent does each item in a 50 item test administered to 50 persons contribute to the total score by that test when each item is scored pass or fail.

    Statistical Procedures:_____

    _____

Compare your responses with those contained in the appendix of this workbook (p.93).

Exercises for Section IX

Proposal Writing

Exercise 9.1 Major components of a Proposal

After careful study of Figure 1 (page IX-5) in the manual, do the following task without looking back at the text:

1) List the component parts (topics and sub-topics) of proposal in Column A below;

2) Write the function of each component in terms of the questions addressed by each in Column B.

A. Components	B. Functions
1. _____	
a. _____	1a. _____
b. _____	1b. _____
c. _____	1c. _____
2. _____	
a. _____	2a. _____
b. _____	2b. _____
c. _____	2c. _____
d. _____	2d. _____
e. _____	2e. _____
f. _____	2f. _____
3. _____	3. _____
4. _____	4. _____
5. _____	5. _____

Now check your responses with the information in Figure 1 of the manual. Then read the Related literature section of the manual.

Exercise 9.2 Introduction - Statement of the Problem

1. The problem section of your proposal will probably be adequate if it has these elements and/or qualities:

2. Following is an example of a Problem section that could be improved. Point out which elements of it are adequate and which are inadequate.

> "Classroom teachers in our school are not familiar with methods of utilizing audio-visual aids"

Now check your responses with those in the appendix of this workbook (p.94). Then read the Objectives section of the manual.

Exercise 9.3 Introduction - Related Literature

1. The Related Literature section of your proposal will probably be adequate if it has these elements and/or qualities.

2. Following is an example of a Related Literature section that could be improved. Identify the elements which are adequate, and those which are inadequate or missing.

> "Dr. Robert Reynolds, in 1952, and Dr. Wm. Bierke in 1968, found that classroom teachers dislike running audio-visual equipment"

Now compare your responses with those contained in the appendix of this workbook (p.94).

Exercise 9.4 Introduction - Objectives

1. The Objectives section of your proposal will probably be adequate if it has these elements or qualities:

2. Following is an example of an objectives section of a proposal. Indicate how completely it follows the criteria you have identified above. Indicate what needs improving or is missing.

"Our objective is to develop some curricular materials appropriate for children of the Blackfoot Indian Tribe"

Now compare your responses with those in the appendix of this workbook (p.94). Then read the Design sections of the Proposal Writing section in the manual.

Exercise 9.5 Procedures - Design, Developmental Projects

1. The design section of your developmental proposal will probably be adequate if it has the following elements and/or qualities.

2. This is an example of a design section which could be improved. Name the elements of it which are adequate and those which are inadequate or missing.

> (Purpose is to extend the remedial reading program into the upper elementary grades, to see if reading deficiencies in Jr. High can to some extent be prevented)
>
> DESIGN: "We plan to train all the 4th, 5th & 6th grade teachers in the X elementary school in methods of remedial reading in a series of workshops"

Now check your responses with those contained in the appendix of this workbook (p.95). Then read the Sampling portion of the Proposal Writing Section of the manual.

Exercise 9.6 Procedures - Sampling

1. The Sample section of your proposal will probably be adequate if it includes these elements and/or qualities:

2. Following is an example of a Sample section of a proposal. Identify the areas you named above which are adequate, and identify those which are inadequate or missing.

"We will include in our project the first four teachers from the local school district who volunteer"

Now compare your responses with those in the appendix of this workbook (p.95). Then read the Data and Analysis portions of the Proposal Writing section in the manual.

Exercise 9.7 Procedure - Data and Analysis

1. The Data and Analysis components of your proposal will probably be adequate if they, together, include the following elements and/or qualities:

2. Following is an example of a data and analysis section which could be improved. Point out those qualities which are adequate, and those which are inadequate or missing.

   Data Analysis: "We will evaluate this program by assessing whether or not the curriculum we have developed has met the children's needs. If results indicate that it has done this, we will develop a set of recommendations for future projects."

Now compare your responses with those in the appendix of this workbook (p.95). Read the brief Schedule portion in the manual.

Exercise 9.8 Procedure - Time Schedules

1. The Time Schedule in your proposal will probably be adequate if it gives the following information.

2. Identify in the following time schedule those elements or qualities which are adequate, and those which are inadequate or missing.

> "The project is planned to take place during the coming school year."

Now compare your responses with those contained in the appendix of this workbook (p.96). Then read the Personnel and Facilities of the manual section on Proposal Writing.

Exercise 9.9 Personnel and Facilities

1. The Personnel and Facilities section of a proposal will probably be satisfactory if it includes these elements and/or qualities:

2. The Personnel and Facilities section printed here could be improved. Indicate which elements are adequate, and which are inadequate or missing.

> "Dr. Charles Montgomery will direct this project, in the special education teacher training lab of the local college."

Now compare your responses with those contained in the appendix of this workbook (p.96).

Exercise 9.10 Budget

1. The budget section of your proposal will probably be adequate if it includes these elements and/or qualities:

2. This budget section of a proposal could be improved. List those elements which are adequate, and those which are inadequate or missing.

Director's Salary	14,000
Materials	200
Travel	900
Total	15,100

Now compare your responses with those contained in the appendix of this workbook (p.96).

APPENDIX

Answers to Exercises

APPENDIX

Answers to Exercises

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Answers to Exercises

Section I - Behavioral Objectives

Exercise 1.1.

1. c	3. b	5. a
2. b	4. a	

Exercise 1.2

1. d	3. a	5. c
2. c	4. d	

	Component	Well Stated?
6.	a. Students	No
	b. Will demonstrate perception by singing	Yes
	c. Within a scale (major or minor) with syllables or numbers at a tempo established by teacher	Yes
	d. (None)	No
7.	a. 10th grade geometry students	Yes
	b. Will write names of each model	Yes
	c. With geometric models of cone... sphere in the order presented	Yes
	d. All names correct, spelling not important	Yes
8.	a. All first grade students	Yes
	b. Will match	Yes
	c. Given letters with given pictures of familiar objects according to beginning letter in name of object	Yes
	d. (None)	No
9.	a. Students in introductory statistics	Yes
	b. Will calculate means and standard deviations	Yes
	c. (None)	No
	d. To the nearest decimal	No
10.	a. Students	No
	b. Will know the correct spelling	No
	c. (None)	No
	d. For 100% of the words	Yes

Exercise 1.3. (Study Exercise)

Exercise 1.4.

First, you should note that the statement does reflect a commitment, or rather a charged responsibility, and consequently is of importance in designing instructional systems for this school. By the same token, the word responsibility implies a number of things and consequently is one that would require some further definition.

Here are a few other words that possibly would require somewhat more detailed definition. Your list may be different from this; these are only suggestions.

Guiding. What does guiding mean, does it mean providing experiences that the student may negotiate on his own instructional program or does it in fact mean precise shaping of his learned repertoire.

Maintain. This word, in context, implies that the learner already has a satisfactory personality and character. Does this word, in fact, mean just this or does it mean that once attaining an appropriate "personality and character" he will be able to maintain this state throughout his life.

Personally satisfying. With wide variance in individual interests and abilities, this can mean a great many things. For some it might mean ability to select friends carefully. For others it might mean ready acceptance as a member of a group. And for still others, it may mean an ability to disassociate from groups and to live and work as individuals.

Pleasant and humane relationships. These types of relationships between a college boy and girl are unquestionably somewhat different from the type of relationships expected between business associates. Both, however, would be more effective if they were pleasant and humane relationships. This difference requires that a precise definition be generated for "other persons." It means that we must identify the life situation in which we expect this person to carry on "pleasant and humane relationships."

Exercise 1.5

The list of objectives which you may have identified as consistent with the philosophic statement may be different from those which I might have identified here. The fact that they would probably be different illustrates the importance of a precise definition for those elements of the philosophy which constitute the most important dimensions of the desired learner data.

Exercise 1.6.

You should have discovered that objectives 1 through 20 are from Handbook II: Affective Domain. Possibly this exercise has demonstrated for you, if it was not clear before, the important relationships that exist between cognitive and affective objectives. Even such activities as carrying on pleasant and humane relationships with other persons require a certain degree of knowledge of how to proceed in such situations. This also emphasizes the difference between CAN DO and DOES DO, as discussed earlier.

Exercise 1.7. (Study Exercise)

Exercise 1.8. (Study Exercise)

Answers to Exercises

Section II - Designing of Instructional Systems

Exercise 2.1

1. The two purposes are: (1) to determine <u>what</u> is to be taught; (2) to determine in what <u>order</u> to teach it.

2. a-4 b-6 c-1 d-5 e-3 f-2

3. Check the figure. You'll find IIa necessary to accomplish Ia, and IIb, IIc, and IIIa necessary to accomplish Ic.

4. IIb - 2
   IIIa - 1

5. Refer to Table 8, page II-15 in the manual

6. Refer to Table 8, page II-15 in the manual

Exercise 2.2

1. a. Assessment

   b. Shaping

   c. Assessment

   d. Orientation

   e. This message does not represent instruction, but group management.

   f. Orientation

   g. Shaping

   h. This message represents feedback!

2. a. Demonstration

   b. Exposition

   c. Illustration

3. 1. D 4. C
   2. E 5. B
   3. A 6. F

4. 1. D 3. A
   2. C 4. B

5. 1 - Concrete representation
   2 - Symbolic representation
   3 - Iconic representation
   4 - Symbolic and iconic representation
   5 - Real-life stimulus
   6 - Analogue representation
   7 - Analogue representation (feedback)
   8 - Analogue representation
   9 - Concrete representation
   10 - Iconic representation (titles are symbolic representation)
   11 - Real-life stimulus
   12 - Real-life feedback
   13 - Symbolic representation (feedback)
   14 - Iconic representation (feedback)

Exercise 2.3

1. The answer to the first test item is <u>False</u>. The nature of the evaluative process used in the instructional system approach does not offer data of a nature that supports or rejects a cause-effect statement. It does, however, help clarify issues and define problems that are most relevant to the researcher-designer.

2. An important effect of using the instructional systems approach is to clarify research issues, as stated above. The brainstorming that comes from a challenge to "think of a research issue" is brought into focus and productivity by struggling through a systematic procedure for specifying instructional conditions.

Answers to Exercises

Section III - Instructional Systems Development

Exercise 3.1.

1) Arranging the try-out. It will be necessary to prepare all necessary try-out facilities including A-V equipment; a "typical" 8th grade student must be obtained from the local schools to act as try-out subject; arrangements for using the student are made through the superintendent; arrangements for car transportation and a schedule of pick-up and return of student are made; extra copies of all instructional materials and tests are produced.

2) Conducting the try-out. The learner is briefed on how he is to behave during the try-out; instruction is provided, carefully following all prescribed pedagogical details; notes of all student comments and responses are written into the materials at the precise point of occurrence; at conclusion of instruction, criterion measures are administered if appropriate.

3) a. Possible learner comments. The learner is apt to state that he cannot find the author's name from the visual; it is possible he will state that he does not understand what to write in the worksheet.

b. Possible learner reactions. The learner might be observed copying into his worksheet all details from the visual without apparent understanding; or the learner might appear confused and not be writing anything.

c. Possible reactions to the Teacher's Guide. The guide materials do not parallel the student materials. No explanation is given for extra details such as author/no author, volume number, + sign.

Answers to Exercises

Section IV - Evaluation of Instructional Systems

Exercise 4.1

1. Point of Origin
   a. Pre-tests
   b. General abilities
   c. Prerequisite behavior

2. Instructional Stimuli
   a. Student comments
   b. Various reviewer comments
   c. Monitor comments

3. Process Indicators
   a. Frame response analysis

4. Learning Indicators
   a. Terminal frame analysis

5. Diagnostic Indicators
   a. Synthesis of data

6. Criterion Indicators
   a. Post Test

Exercise 4.2.

A. Formative Evaluation: It is the process by which information is used to develop a unit of instruction to the point where it is ready to be broadly applied.

B. Techniques:

   1. Tutorial Approach
   2. Large-Group Frame analysis
   3. Blackout Technique

Answers to Exercises

Section V - Measurement

Exercise 5.1.

1. To lead to the extension of generalizable knowledge through experimental manipulation and control of as many variables as possible.

2. To identify need for new instructional effort; to analyze strengths and weaknesses of a system in relation to its formulation, design, effectiveness, relevance and/or appropriateness.

Exercise 5.2 (Study Exercise)

Exercise 5.3 There would seem to be no single "credit" solution for this task. However, you may have indicated something as follows:

Constructs:	The primary construct is that of <u>creativity</u>, of secondary concern is creativity in writing.
Properties:	A property of creativity in writing might be the ability to interweave figurative and literal language so that the desired understanding or affect is better achieved.
Indicant:	Several indicants may be though of, e.g., the effective use of analogies, metaphors, and/or similes in a piece of writing; the expansion of a single statement into a relevant drama, etc.
Inferences:	In terms of the above, the inferences are that creativity actually has the indicated property, that we understand what it is to "interweave" effectively, and that we can tell about "better" achievement of "understanding."
Restrictiveness	Obviously, if you or the instructor build the measure according to the indicants agreed upon, the information obtained about the achievement of creativity in writing is limited to those items. The indicants listed above could be changed from a focus on measurable behaviors of the creative writer to specifying the behaviors exhibited by the readers of creative writing.

Meaning: Finally, it is particularly difficult to deal with the notion of creativity as a construct having definable properties and indicants without some sort of definition. Hence the meaning of some of the properties and indicants listed above lose their meaning.

Deliberately, the exercise has dealt with a relatively abstract construct. This has been to emphasize the importance of having a sound conceptual basis for a construct before thinking about what is to be measured. At a lower level of abstraction (but still needing of some thought) would be numerical reasoning as a construct. In addition, thinking about these constructs as they have meaning for statements of objectives helps clarify both the objectives as well as the quantities to be measured.

Exercise 5.4

1. T
2. F
3. F
4. F
5. F
6. T
7. T
8. T
9. F
10. T

Exercise 5.5. (Study Exercise)

Exercise 5.6.

1. 1) e
   2) c
   3) f
   4) b
   5) d
   6) a

2. a. Title: The title of the test has no apparent relevance for the measurement task.

   b. Directions: While the directions seem to spell out what is to be done, the two minute time limit does not appear to be relevant to the issue of creativity in writing, and certainly it would not be representative of the breadth of creativity possible.

   c. Items: To simplify this discussion, item #2 does not meet any of the criteria; item #1 seems relevant,

somewhat representative, and the act of writing has fidelity; #3 is suspect because being able to define similie says nothing about being able to use it; #4 also appears irrelevant in identifying potentially creative writers; #5 may have some relevance for the selection process, but since the rules aren't clear one could not justify analyzing such statements on a "creative" basis. Etc.

Exercise 5.7.

1. 1) a,b

   2) a,b,c

   3) a,b,c

   4) a,b,c

   5) a,b

2. Each administrator and/or coder must establish reliability for each of the contexts in which a measure is taken.

Exercise 5.8.

1. a. Planning the measure

   1) Decide fidelity of the item
   2) Decide representativeness of the items
   3) Decide on weight given each item

   b. Developing the measure

   1) Develop an "item" pool
   2) Develop directions
   3) Develop a "scoring" system

   c. Trying out the measure

   1) Insure best measurement conditions
   2) Allow adequate measurement time

d. Evaluating the measure

1) Identify use of test:

a) Mastery of criterion
b) Diagnostic
c) Distinguishing between students

2) Analyze items in relation to above.

2. There is the added requirement of evidence of construct validity for high inference measures. Operationally, this means that there must be some empirical evidence that the measure is in fact measuring that which it is supposed to be measuring.

Answers to Exercises

Section VI - Research Design

Exercise 6.1

a. Randomized group, repeated measures

b. Randomized group

c. Factorial

d. One-shot

e. Solomon 4 group

f. Static group

g. Pre-post randomized group

h. One-shot repeated measure

i. Randomized block

j. One group pre-post

k. Latin square

Exercise 6.2

1. 2 x 2 Factorial

2. Random group, repeated measures

3. Randomized block

4. 3 x 4 Factorial

5. Solomon 4 group

Answers for Exercises

Section VII - Data Analysis

Exercise 7.1.

1. c	3. b	5. c	7. c	9. a
2. a	4. c	6. b	8. a	10. b

Exercise 7.2

1. 1) a	4) d	7) b	
2) b	5) b	8) a	
3) a	6) d	9) b	
2. 1) b	4) b		
2) a	5) a		
3) b			

Exercise 7.3

1. a) 3	c) 2	e) 12	
b) 3	d) 2		

2. a) random selection

   b) from an infinitely large population

   c) having normal distribution

3. a) R	c) R		
b) I	d) R		

Exercise 7.4

1. 2, I	4. 2, I	7. 3, I	10. 2, I
2. 4, I	5. 2, R	8. 6, I	11. 12, I
3. 2, R	6. 2, I	9. 2, I	

Exercise 7.5

7.4. 1. H-I, E	5. H-I, E	8. H-II, C	
2. H-II, C	6. H-I, E	9. H-II, C	
3. H-I, E	7. H-II,C	10. H-II, C	
4. H-I, E			

Exercise 7.6 (Study exercise)

Exercise 7.7

1. Mean (Note 18)
2. t-test for separate group or pooled variance (Note 4)
3. rho or Tau (Note 12)
4. Mode (Note 18)
5. Convert IQ to Class B and use rho (Note 12)
6. Mode (Note 18)
7. Mann-Whitney U-Test (Note 5)
8. Contingency coefficient (Note 13)
9. rho or Tau (Note 12)
10. Convert weights to rank order and use rho (Note 12)
11. Kendall partial rank-correlation (Note 16)
12. Discriminate analysis (Note 17)
13. Multiple regression analysis (Note 15)

Answers to Exercises

Section IX - Proposal Writing

Exercise 9.1 (Page IX-5 of the CORD manual)

Exercise 9.2

Elements of Problem section

1) identify problem and need
2) importance of the problem
3) relationship of proposed project to problem
4) preview of approach you will use

Example

While the problem is identified, the importance of this problem, the relationship of the project to the problem, and a preview of approach are missing.

Exercise 9.3

Elements of Related Literature Section

1) summary of related projects or research you have found
2) evaluation of the above
3) relationship between the research and your project

Example

The example summarized some related projects, but failed to evaluate those projects, or to show how the current project related to them.

Exercise 9.4

Elements of Objectives Section

1) main objectives
   a. desired goal
   b. methods planned to reach goal
   c. evaluation of effectiveness

2) important subobjectives

Example

Desired goal is identified, but the methods of reaching the goal, evaluation of effectiveness, and subobjectives are omitted.

Exercise 9.5

Elements of Design (Development Projects)

1) Overview

2) Description of each phase of project
   a. purpose of each phase
   b. detailed description of activities
   c. indication of evaluation of outcome
   d. provisions for changes
   e. approximate time needed for each phase

Example

This is an adequate overview, but all elements of item 2 above are omitted.

Exercise 9.6

Sample elements

1. Description of sample - "5 Ws"
2. Characteristics which may affect results
3. Uncontrolled variables
4. The method for selection

Example

The method of selection and some characteristic of each subject is included, other characteristics which may affect results, and uncontrolled variables are not mentioned.

Exercise 9.7

Data and Analysis elements: Developmental

1. at what points will you collect data for evaluation
2. type of evaluation techniques
3. data collection - where and how, who
4. codification and analysis
5. utilization of analysis and data

Example

The utilization of the analysis and data is included. When measuring will be done, techniques for data collection, who, how and where it will be collected, and how it will be organized and analyzed are omitted.

Exercise 9.8

Time Schedule elements:

1. Estimated total time

2. Breakdown of total time by major phases

Example

An estimate of total time is indicated, but has no exact dates. A breakdown into elements of the project, with time needs for each, is missing.

Exercise 9.9

Personnel and Facilities elements:

1. Personnel
   a. names
   b. relevant experience

2. Facilities
   a. presently available
   b. cooperation of other agencies

Example

The name of personnel is present, as is an indicator of facilities. However, competencies of the director which apply to this project are not mentioned, special aspects of this classroom which will be helpful for this project are not listed, and no recognition of cooperation from other agencies is indicated.

Exercise 9.10

Budget elements:

1. Direct costs

2. Indirect costs

3. Total costs

Example

The example includes direct costs and total costs, but omits indirect costs entirely.